

ABSTRACT

The present invention comprises a steering system selectively operable in one of six modes: steer-by-wire with rear steering, steer-by-wire without rear steering, electronic power assist steering (EPAS) with rear steering, electronic power steering (EPAS) without rear steering, mechanical backup manual steering with rear steering, and mechanical backup manual steering without rear steering. The steer-by-wire system includes a driver interface system (DIS), a front road wheel actuator system (FRWAS), a rear road wheel actuator system (RRWAS), and a controller for monitoring and implementing the preferred control strategy. The steering system of the present invention operates normally in a steer-by-wire mode. In each of the EPAS mode and manual mode, the controller causes a clutch mechanism to engage, thus creating a mechanical linkage between the steerable member and the rack and pinion system while maintaining rear wheel assisted steering. In the EPAS mode, one of the front road wheel actuator or the reaction torque generator is available to assist in the steering operation along with rear wheel steering. Alternatively, in the manual mode, both the DIS and the FRWAS are deactivated and the vehicle is steerable through mechanical means along with the rear wheel assisted steering.